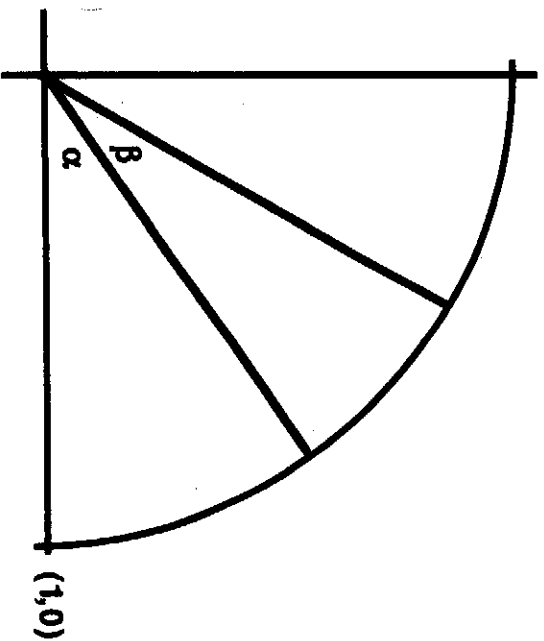


## Two New Trig Identities

Does  $\sin\left(\frac{\pi}{4} + \frac{\pi}{6}\right) = \sin\left(\frac{\pi}{4}\right) + \sin\left(\frac{\pi}{6}\right)$ ? \_\_\_\_\_

Does  $\cos(\pi + x) = \cos(\pi) + \cos(x)$ ? \_\_\_\_\_  
Graph the two functions to see!

We want formulas for  $\sin(\alpha + \beta)$  and  $\cos(\alpha + \beta)$ . We know  $\sin(\alpha) \neq \sin(\beta)$ , and  $\cos(\alpha + \beta) \neq \cos(\alpha) + \cos(\beta)$ !



$$\sin(\alpha + \beta) =$$

1. Show  $\cos \alpha$ ,  $\sin \alpha$ , and  $\cos(\alpha + \beta)$ , and  $\sin(\alpha + \beta)$ .
2. Make a right triangle by drawing side opposite  $\beta$  to terminal side of  $\alpha$ . Also show  $\cos \beta$  and  $\sin \beta$ . (These last two are important!)
3. Draw vertical line segment to show  $\sin(\alpha + \beta)$ . Label other angle  $\alpha$ .
4. Draw horizontal segment to show and label segments a and b. Draw and label other segment a.
5. We are going to concentrate on the "little triangle" at the top with  $\alpha$  and b, and the "big triangle" at the bottom with  $\alpha$  and a.

$$\cos(\alpha + \beta) =$$

6. Label segments c, d, and other d.